American Society for Testing Materials BULLETIN

ISSUED BI MONTHLY

THIS ISSUE

Reviews the

Activities of the Society in 1931

Announces the

Cleveland Regional Meeting Program

Announces the

New York Local Meeting on February 18

Organization of a Sectional Committee on Sieves

Discusses the

Embrittlement Investigation of Hot-Galvanized Structural Steel

January, 1932

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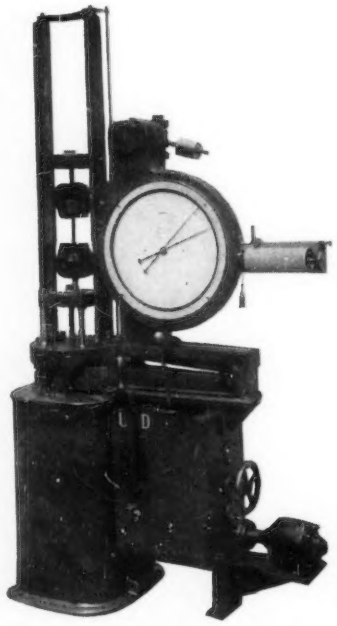
Olsen Universal Testing Machines

Screw Power or Hydraulic Straining System



Olsen Universal Testing Machine —Screw power rotating gear nut type, with Automotive Gear Box Drive, and self-indicating dial weighing system with recorder.

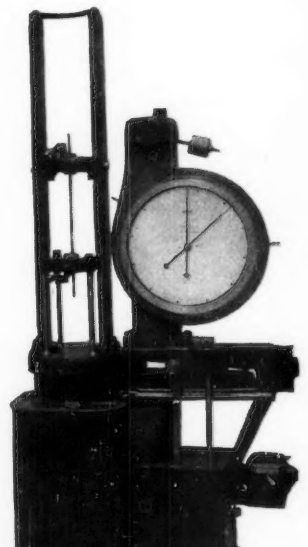
Independent all-lever self-indicating dial weighing system with or without recorder.

Weighing system absolutely independent of the straining system, entirely mechanical, and not coupled with any hydraulic mechanism.

The Greatest of ACCURACY, RELIABILITY, and SENSITIVITY Guaranteed

Indicating dial of a very large size with two revolutions of pointer to indicate maximum capacity, made in dual, triple, or quadruple capacity reading, either indicating or recording, as may be desired.

Such machines can be obtained in any capacity from the smallest to the very largest in the range of Olsen Universal Testing Machines.



Olsen Universal Testing Machine, hydraulic straining mechanism with self-indicating dial weighing system.

TINIUS OLSEN TESTING MACHINE COMPANY

500 NORTH 12th STREET / / PHILADELPHIA, PA.

American Society for Testing Materials

BULLETIN

ENGINEERS' CLUB BUILDING 1315 SPRUCE STREET PHILADELPHIA, PA.

NUMBER 54 JANUARY 30, 1932

Symposium on Rubber at Cleveland Regional Meeting

THE chief feature of the coming Cleveland Regional Meeting on March 9 is a Symposium on Rubber. Preliminary announcement of this meeting appeared in the December BULLETIN which also mentioned that the Spring Group Meetings of committees would be held during the week beginning March 7, in the Hotel Cleveland.

The Cleveland District Committee, shortly after its organization last May recommended that a Regional Meeting be held in Cleveland in 1932 and suggested that a Symposium on Rubber be held. The Executive Committee approved these recommendations. Committee D-11 on Rubber Products was invited to cooperate with the District Committee and has sponsored the interesting and valuable program which is contemplated. The chairman of the Cleveland District Committee is H. A. Schwartz. Arthur W. Carpenter is Chairman of the Program Committee.

Technical Program

Many suggestions have been made that the Society respond to the increasing need for reliable information concerning the manufacture and properties of rubber, specifically with relation to the engineering applications. There is a definite need for authoritative technical information on this subject—information which will be in concise, readily available form. The program has been arranged with this in view. The authorities on rubber, who will present papers, will discuss their subjects in a broad way—not to reach a group of rubber technologists, but to bring home to the technical men and engineers present, pertinent, usable data on rubber and its products.

Two sessions will be devoted to the Symposium. In the morning session, five papers will be given dealing with the manufacture of rubber products. It is intended that this session will build up a knowledge of rubber technology and manufacture which will serve as a foundation for consideration of the papers in the afternoon session. These will deal with the properties of rubber as an engineering material and point out the applications of rubber products. The papers which will be delivered in the Symposium are listed here. Slight changes in the titles, or author changes, may occur before the final program is completed.

SYMPOSIUM ON RUBBER

Morning Session

I. Manufacture of Rubber Products

1. The Extent and Diversity of the Rubber Industry—A. W. Carpenter, Manager of Testing Laboratories, The B. F. Goodrich Co.
2. Crude and Reclaimed Rubber—R. H. Gerke, Development Dept., U. S. Rubber Co.
3. Vulcanization—N. A. Shepard, Director of Chemical Research, The Firestone Tire and Rubber Co.
4. Compounding.—A Discussion of the Fillers, Reinforcing Agents and Softeners Used in the Compounding of Rubber—R. H. Seeds, Development Dept., The Goodyear Tire and Rubber Co.
5. Structures of Rubber in Combination with Textiles and Other Materials—C. H. Zieme, Technical Superintendent, Republic Rubber Co.

Afternoon Session

II. Properties of Rubber as an Engineering Material

1. The Flexing of Rubber Products—E. G. Kimmich, Development Dept., The Goodyear Tire and Rubber Co.
2. The Use of Rubber for Absorption of Shock and Vibration—R. K. Lee, Director of Research, Chrysler Corp.
3. Some Factors Involved in the Destruction of Rubber Products by Wear—V. A. Cosler, Technical Superintendent, Hewitt-Gutta Percha Rubber Corp.
4. The Chemical Resistance of Rubber as an Engineering Material—H. E. Fritz, Manager, and J. R. Hoover, Assistant Manager, Chemical Sales Division, The B. F. Goodrich Co.
5. Resistance of Rubber to Water and Gases—R. H. Gerke, Development Dept., U. S. Rubber Co.
6. Electrical Characteristics of Rubber Insulation—E. W. Davis and G. J. Crowdes, Electrical Engineers, Simplex Wire and Cable Co.
7. Rubber as an Adhesive in Tape, Cements, Frictions and Metal Bonding—J. J. Allen, Chief Compounder, and J. E. Beyer, Compounder, Mechanical Goods Division, The Firestone Tire and Rubber Co.

Papers to be Preprinted

Every effort will be made to have the papers preprinted and distributed in advance of the meeting. There is no better way of stimulating pertinent and valuable discussion than by having the papers in advance in the hands of those who will attend the meeting. With this BULLETIN is a preprint request card which can be used to obtain copies of the available papers. This should be mailed promptly.

Regional Meeting Dinner and Inspection Trip

An informal dinner will be held following the afternoon session. It is planned to have an official of the Goodyear-Zeppelin Corporation speak on "Lighter-than-Air Ships."

An inspection trip will be arranged on Thursday or Friday, or both, to take in the Goodyear-Zeppelin Dock at Akron, where a second large airship is being constructed. The groups will then divide, some going to the Goodyear plant, others to the Goodrich plant and the remainder to the Firestone plant.

Reduced Railroad Rates

Application has been made to the passenger associations for reduced rates to Cleveland during the Regional Meeting and the Spring Group Committee Meetings. These reductions have been granted the past several years and it is fully expected that they will be in effect this year. The reduction will be on the certificate plan at fare and one-half fare for the round trip, provided the same route is used both going and returning and provided further that 150 certificates are turned in for validation. Members should purchase the regular one way ticket to Cleveland at the railroad ticket office and must secure a certificate (*not a receipt*) from the ticket agent when making the purchase. These certificates will be validated by the railroad representative at the A.S.T.M. registration desk in the Hotel Cleveland. Members will then be able to purchase the return ticket at one-half fare. These special rates will afford a considerable saving to many of our members and it is accordingly urged that each member secure a certificate whether or not he intends to use it, and to deposit it at the registration desk immediately on his arrival since the reduction in rates cannot become effective until 150 certificates have been turned in.

Group Committee Meetings

More than 20 of the Society's committees plan to hold meetings in conjunction with the Annual Spring Group Committee Meetings extending over March 7–11. Undoubtedly a large group of those who are attending the committee meetings will also attend the Regional Meeting.

Research on Embrittlement of Structural Steel in Hot Galvanizing

In June, 1930, the Utilities Research Commission of Chicago instituted a systematic research on the embrittlement of hot-dipped galvanized structural steel. Reports had been received of such steel angles breaking with a brittle fracture through a joint or rivet hole. Although these were very rare indeed, the American Society for Testing Materials instituted an additional study of the problem in December, 1930. In July, 1931, these studies were merged and the work since has been sponsored by Subcommittee X of the Society's Committee A-5 on Corrosion of Iron and Steel through a Steering Committee. The work has been done at Battelle Memorial Institute and it is carried on by subscriptions from a large number of consumers, steel producers, and fabricators, a partial list of which appeared in the December, 1930, BULLETIN.

From the beginning it was planned to obtain an engineering solution of the problem. Angles of different sizes and of different classes of steel from over 130 heats have been tested very thoroughly in over 3000 tests. In all these, no material of the type spoken of as typically susceptible to embrittlement has come to light and no direct proof has appeared that it exists. Although not a single failure due to brittleness in a transmission tower or other similar structure has been reported in the last 18 months (indicating the great rarity of embrittlement) a study made has shown that in fabricating and galvanizing, factors arise which may cause angles to show brittle behavior.

Brittleness, that is failure with little or no deformation at the fracture, is not revealed in the ordinary tension test or in the notched-bar impact test on unworked material, but shows up if present when an angle with a hole punched near the toe of one of the legs is tested in the angle bend test. The different behavior in the punched hole angle bend test undoubtedly lies in the cold work produced about the punched hole. Impact tests of cold-worked specimens show similar brittleness. With drilled, or sub-punched and reamed holes, severe brittleness is not encountered except in large bessemer steel angles.

It was found that the thicker the angle, the greater the effect of punching and the greater the likelihood of brittleness. Coarser grain size in the larger angles also promotes brittle behavior. In the many tests made, brittleness was not found in open-hearth steel angles less than ¾-in. thick; very infrequently in ¾-in. thick angles; but rather frequently in 1 in. thick angles. Brittle behavior increased markedly on lowering the testing temperature, which corroborates reports of angles breaking with a brittle fracture during construction in freezing weather.

Compared to punching, both pickling and galvanizing may be classed as minor embrittling factors, although not negligible ones, for often the larger angles are brought so near the verge of brittleness by punching that the slight effect of pickling or galvanizing is enough to throw the balance toward brittle behavior. Pickling embrittlement appears to be due to hydrogen absorption and disappears after several days standing. Galvanizing embrittlement seems to be due to heating to the blue heat temperature after cold work (the cold work being due to punching the hole). Penetration of the iron-zinc compound formed in galvanizing along the tears and cracks inside of a punched hole appears to add to the embrittlement to a minor degree.

Indicated remedies for embrittlement are drilling, or subpunching and reaming, the larger sized angles or heating to a high enough temperature after punching to eliminate the cold work effect. The development of a practical commercial steel without appreciable susceptibility to embrittlement would however be the most satisfactory solution.

At present, the study at Battelle is being directed mainly toward standardizing the angle bend test and comparing it with a somewhat similar "hole tension test" in which a coupon cut from the angle with a hole in it is tested in tension with the view of determining the utility of these tests in specifications. Further work is also in progress on ascertaining more definitely which chemical elements are mainly responsible for embrittlement in structural steel.

Society Appointments

Stanton Walker, Director, Engineering and Research Division, National Sand and Gravel Association, has been appointed one of the A.S.T.M. representatives on the Joint Committee on Concrete and Reinforced Concrete. He succeeds Cloyd M. Chapman, who resigned from this committee.

R. E. Petersen, Manager, Mechanical Division, Research Laboratories, Westinghouse Electric and Manufacturing Co., and T. S. Fuller, Metallurgist, Research Laboratories, General Electric Co., have been appointed members of the Research Committee on Fatigue of Metals.

Joint Meeting of New York District Members and A.I.M.E. Divisions on February 18

A joint meeting of the A.S.T.M. members in the New York Metropolitan District and the Iron and Steel Division, Institute of Metals Division and New York Section of the American Institute of Mining and Metallurgical Engineers will be held on February 18. The meeting is scheduled to begin at 8 p. m. in the auditorium of the Engineering Societies Building, 29 West 39th Street. It will take place during the annual meeting of the A.I.M.E., which is to be held during the week of February 15. This meeting is the third sponsored by the New York District Committee.

Program

The general discussion of the meeting will be on the subject of metals. Dr. F. O. Clements, Technical Director, General Motors Research Laboratories, and President of the Society, will discuss the subject "Limitations of our Fundamental Knowledge of the Properties of Metals." Prof. H. F. Moore, Research Professor of Engineering Materials, University of Illinois, and Past-President of the Society, will address the meeting on "Test Results and Service Values of Metals." Both of these men from long and active connection with the metals field are splendidly qualified to discuss these subjects.

In keeping with the general topic of the evening, there will be a demonstration of ten different tests of welds given by A. B. Kinzel and W. B. Miller, Union Carbide and Carbon Research Laboratories, Inc., and John J. Crowe, Air Reduction Laboratories, Inc. These tests will be as follows:

1. Visual Inspections
2. Bending Test
3. Tension Test
4. Hardness Test
5. Specific Gravity Test
6. Stethoscopic Test
7. Invisible Ray Test
8. Compression and Drift Test
9. Hydrostatic Internal Pressure Test
10. Hammer and Anvil Nick Break Test

All members of the societies and their friends are cordially invited to attend this meeting, and all who are interested in this subject will be welcomed.

Proceedings of Zurich Congress

A pamphlet outlining the Proceedings of the Zurich Congress of the New International Association for Testing Materials held last September has been mailed from abroad to all American members of the N.I.A.T.M. The prepublication and regular prices for the Proceedings are given.

The prices of the Proceedings, including 6 Swiss francs to cover mailing charges, as fixed by the N.I.A.T.M. follow:

Orders received prior to February 29:

Prepublication price to members of the N.I.A.T.M. and to those who attended the Congress or paid the Congress fee.. Swiss francs 51.
To non-members of the N.I.A.T.M..... Swiss francs 71.

On orders dated later than February 29:

To members of the N.I.A.T.M..... Swiss francs 66.
To non-members of the N.I.A.T.M..... Swiss francs 86.

Orders for the Proceedings may be mailed to A.S.T.M. Headquarters, but should be accompanied by the proper remittance in Swiss francs payable to the order of the N.I.A.T.M. at the Union Bank of Switzerland.

A limited number of the descriptive pamphlets is available at A.S.T.M. Headquarters and copies will be sent on request.

Sectional Committee on Sieves for Testing Purposes Is Organized

On December 15, the organization meeting of the Sectional Committee on Sieves for Testing Purposes was held at A.S.T.M. Headquarters. This committee was formed and will function in accordance with the sectional committee procedure of the American Standards Association with the National Bureau of Standards and the A.S.T.M. as joint sponsors. The Bureau developed the first specifications for sieves recognized in this country and has been greatly interested in this subject since that time. Its present specifications and those of the A.S.T.M. were developed jointly and are identical. These will serve as a basis for discussion in the new committee.

The committee has the following scope:

"Specifications for sieves (screens) for testing purposes, including nominal dimensions, tolerances, designation and methods of verification; also, methods for reporting results of sieving."

A subcommittee organization was decided upon to include five groups which will investigate generally the following:

1. Coarse sieves—to include primarily the range above ¼ in. and larger, both round and square openings.
2. Fine sieves—to include Number 4 to the finest commercially made.
3. Pigments group—special problems of fine mesh sieves used for wet or dry sieving.
4. Representation of data—to recommend standard methods of representing fineness data, individual percentage on sieve or other form of distribution curve.
5. Calibration—to cooperate with committees (1) and (2) on tolerances and proposed methods of testing.

The Committee selected the following as officers:

Chairman: L. T. Work, Assistant Professor of Chemical Engineering, Columbia University.

Vice-Chairman: F. H. Jackson, Senior Engineer of Tests, U. S. Bureau of Public Roads.

Secretary: L. V. Judson, Physicist, National Bureau of Standards.

The Sectional Committee will serve as the American contact in international discussions on sieves for testing purposes and the Secretary, Mr. L. V. Judson, has been designated the American representative on an International Committee on Sieves functioning under the International Standards Association.

Another Sustaining Member

The Vacuum Oil Co., with headquarters at 61 Broadway, New York City, has recently taken out a Sustaining Membership in the Society. This company is the fourth to become a sustaining member; the others have been announced in previous issues of the BULLETIN.

Committees on Clay Pipe and on Concrete Pipe

By action of the Executive Committee of the Society, the subjects of clay pipe and concrete pipe will no longer be considered in one standing committee of the Society as heretofore, in Committee C-4 on Clay and Concrete Pipe. The committee is to be reorganized as Committee C-4 on Clay Pipe and a new standing committee of the Society, Committee C-13 on Concrete Pipe, will be formed. The scope of this new committee will be such as to include concrete pipe for sewers, culverts, irrigation and water supply purposes and similar uses.

AMERICAN SOCIETY FOR TESTING MATERIALS

BULLETIN

Issued Bi-Monthly

Engineers' Club Building, 1315 Spruce St., Philadelphia, Pa.

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Number 54 January 30, 1932

A Timely Message from Our President

THE A.S.T.M. individually and the A.S.T.M. as a technical society has weathered the storm. We closed the fiscal year on the right side of the ledger despite conditions that led to a slight falling off in membership. It is true we all have less to live upon but it is certainly true that we have just as much and more to live for. Our membership is composed of thinking men, much concerned about the welfare of others and the future of our country.

We all appreciate that the real values of life are solid and unshaken. The depression has not lowered the value of our friends and our high regard for one another. This particular year is an appropriate time to count our many blessings. Outside of food, shelter and clothing, the most important things in the world cannot be bought with money. And these truly valuable things are spelled with few letters, mainly one syllable words: God, home, love, wife, child, friend, peace, faith, joy. . . .

Furthermore, a man finds mighty little satisfaction in life by merely owning something. A depression can rob us of all we have, but it cannot affect what we are.

We are never licked until we admit it, and I am certain that our membership does not contain many quitters.

Now is the time to put on our fighting clothes. Much of the world's work is done on faith, a currency more precious than gold. I am certain that our organization will be found in the front ranks, fighting always valiantly and I am also certain that 1932 holds much of promise for all of us. And so I have the great pleasure of extending to you, individually, the best of wishes for 1932.

F. O. Clements

What Shall I Talk About?

What shall I talk about? This is a question that arises in the mind of anyone who is requested to deliver an impromptu or formal address or talk before a group. Many members of the Society are called upon to make a speech. The same question pops up.

Recently, an active member of the Society was asked to address a group of business men. One of the reasons for his prompt acceptance was the fact that he had a subject right at hand on which he could talk—none other than "the American Society for Testing Materials." Other members of the Society on learning of this made a suggestion that the Society and its work or phases of its many activities would make a good subject for such talks.

Some time ago a member of the Kiwanis Club addressed the regular weekly gathering of his group. He described a modern testing laboratory in a nearby technical school and emphasized the importance of testing and also in the course of his talk outlined the work of the A.S.T.M. and its activities. This is one example of how the work of the Society can be brought home to the average business man. A.S.T.M. work is of great value to him, directly and indirectly. The economic significance of specifications for materials is appreciated by A.S.T.M. members. Their fundamental importance should be emphasized to every executive and business man. As a consumer or producer he will be interested.

Should any of the members of the Society be called upon to give a talk or address before a group of men, Headquarters is prepared to furnish pamphlets and information which can be used as a basis.

Book of Standards Used as a Reference Text

More than 25 seniors in the Department of Chemical Engineering of the Ohio State University are now student members of the Society and are using the Book of Standards (with 1931 Supplement) as a reference text in their course in Technical Control Methods. This information was received from J. R. Withrow, Professor of Chemical Engineering. Many engineering students in other colleges are using the books of selected standards for students as supplementary books to their various courses, but this is the first instance to come to our attention of a use of the Book of Standards as a reference text. This use of this important Society publication is indicative of another phase of its value to engineers and technical men.

The seniors, by joining the Society, were enabled to purchase the volumes they wished, either Part II or both parts of the Book of Standards at special reduced prices. The users will not only benefit from the books while in the university, but they will be equipped for future work.

Offers of Papers for 1932 Annual Meeting

Members are reminded of the invitation to submit offers of technical papers for presentation at the 1932 annual meeting. This invitation was extended to all members in a circular sent out December 1. All offers accompanied by a summary and received not later than February 23 will be considered by the Committee on Papers and Publications, but consideration of offers received after that date is entirely contingent upon the condition of the Provisional Program when the offer is received.

New Members to January 19, 1932

The following 43 members were elected from December 1, 1931 to January 19, 1932:

Company Members (4)

Corning Glass Works, J. T. Littleton, Chief, Physical Lab., Corning, N. Y.

Nassau Smelting and Refining Co., Inc., W. A. Scheuch, Works Manager, Bethel Ave., Tottenville, Staten Island, N. Y.

New York & New Jersey Lubricant Co., W. F. Kimball, President, 292 Madison Ave., New York City.

Settsu Seiyu Kabushiki Kaisha, 16 Yasui-Cho, Konohana-Ku, Osaka, Japan.

Individual and Other Members (32)

Boehm, R. M., Director of Research, Masonite Corp., Laurel, Mass.

Bowen, Cromwell, Engr., Robert W. Hunt Co. For mail: 809 Elmwood Ave., Wilmette, Ill.

Breuil, Pierre, Consulting Engr., Villa Antoinette-Maria, Route d'Abrest, Vichy (Allier), France.

Bubb, H. D., Jr., Chief Metallurgist, Thompson Products, Inc., 2196 Clarkwood Road, Cleveland, Ohio.

Burroughs, L. C., Chief Chemist, Shell Petroleum Corp., Arkansas City, Kans.

Cohn, M. C., Consultant on Housing and Building Regulations, 216 Sheldon Bldg., 461 Market St., San Francisco, Calif.

Crandell, J. S., Professor of Highway Eng., University of Illinois, Urbana, Ill.

Crowell, C. B., Research Engr., Maverick County Water Control and Insp. District No. 1, Box 281, Eagle Pass, Tex.

Cheetham, J. L. E., Plant Manager, Ammonia Dept., E. I. du Pont de Nemours and Co., Inc., Box 1537, Charleston, W. Va.

Dewell, H. D., Consulting Civil Engr., 55 New Montgomery St., San Francisco, Calif.

Eplett, A. D., Development Engr., Consolidated Ashcroft Hancock Co. For mail: 12 Beechwood Ave., Bridgeport, Conn.

Gray, J. E., Lab. Engr., Nat. Crushed Stone Assn., Merchandise Bldg., 1735 14th St., N. W., Washington, D. C.

Grossman, Louis, Civil Engr., Subway Constr., Board of Transportation of the City of New York. For mail: 200 E. 102d St.

Hasting, H. P., Chief Chemist, Anaconda Wire and Cable Co., 8th St., Marion, Ind.

Heyser, J. A., Petroleum Engr., Wilshire Oil Co., Inc., 2455 E. 27th St., Los Angeles, Calif.

Hyde, H. Y., Supervisor, Research and Development Dept., Associated Oil Co., 79 New Montgomery St., San Francisco, Calif. For mail: Associated Oil Co., Associated, Calif.

Kratoville, J. C., Chemist, Research Lab., The Barrett Co., Edgewater, N. J. For mail: Mountain Ave., North Caldwell, N. J.

Kreusser, O. T., Director, Museum of Science and Industry, Chicago, Ill. For mail: 9333 Damon Ave., Chicago, Ill.

Marlies, C. A., Instructor, College of the City of New York, Convent Ave. and 145th St., New York City.

Marr, R. B., Manager, General Labs., Dominion Rubber Co., Ltd., 1665 Notre Dame St., Montreal, P. Q., Canada.

McNerney, J. J., Vice-President, The Hyvis Oil Refining Co., 424 Commercial St., Los Angeles, Calif.

Meade, J. L., Manager, Testing Lab., Bear Brand Hosiery Co., 337 W. Madison St., Chicago, Ill.

Monahan, F. S., Chief Chemist, Standard Oil Co. of New Jersey, Bayonne, N. J.

Porter, E. H., Chemist, Public Service Elec. and Gas Co., Box 66, Harrison, N. J.

Reynolds, W. H., President, Am. Instrument Co., 774 Girard St., N. W., Washington, D. C.

Ruff, H. T., Research Chemist, Mead Corp., Chillicothe, Ohio.

Savidge, R. W., Head Chemist, Union Pacific System, 4353 Dodge St., Omaha, Nebr.

Thomas, C. Y., Mech. Engr., Pittsburg & Midway Coal Mining Co., Nat. Bank Bldg., Pittsburg, Kans.

Vanderbilt University Library, Nashville, Tenn.

Watanabe, Saburo, President, Nippon Tokushiko Goshi Kaisha, Omori, Tokio, Japan.

Wolf, H. Comer, Wolf Eng. Co., Field Office No. 4, Iantha, Mo.

Woodruff, G. B., Engr. of Design, San Francisco-Oakland Bay Bridge, 500 Sansome St., San Francisco, Calif.

Junior Members (7)

Chape, Bruno, Civil Engr., 7 Miles St., Binghamton, N. Y.

Dohrenwend, C. O., Instructor, Dept. of Mechanics, Rensselaer Polytechnic Inst. For mail: R. S. E. House, Sage Ave., Troy, N. Y.

Hopkins, W. R., Test Engr., Lycoming Mfg. Co., Williamsport, Pa. For mail: 328 Lowe St., South Williamsport, Pa.

Kinney, J. Sterling, Instructor, Rensselaer Polytechnic Inst. For mail: 2213 12th St. Troy, N. Y.

Noland, T. J., Jr., Hoover Dam Cooperative Investigation, 202 Eng. Materials Lab., University of California, Berkeley, Calif.

Peskin, L. C., Instructor, Room 5-229, Bldg. Constr. Dept., Massachusetts Inst. of Tech., Cambridge, Mass.

Sprague, J. C., Inspector, U. S. Engr. Office, War Dept., Federal Bldg., Charleston, W. Va. For mail: 637 6th St., Huntington, W. Va.

Schedule of Committee Meetings

DATE	COMMITTEE	PLACE
February 5	C-4 on Clay and Concrete Pipe	New York City
February 15–16	B-4 on Electrical-Heating, Electrical-Resistance and Electric-Furnace Alloys	New York City
February 16	M-20—Sectional Committee on Classification of Coals	New York City
February 18	Subcommittees of Committee B-5 on Copper and Copper Alloys, Cast and Wrought	New York City
February 18	B-3 on Die-Cast Metals and Alloys	New York City
February 18	E-4 on Metallography	New York City
February 29	C-12 on Mortars for Unit Masonry	Washington, D. C.
February	C-8 on Refractories	Washington, D. C.
February	E-6 on Papers and Publications	Philadelphia
February	E-10 on Standards	Philadelphia
March 1	C-1 on Cement	Washington, D. C.
March 3–4	D-9 on Electrical Insulating Materials	New York City
March 7–11	SPRING GROUP MEETINGS OF COMMITTEES	Cleveland, Ohio
March 10–11	D-13 on Textile Materials	Providence, R. I.
March	D-1 on Preservative Coatings for Structural Materials	Philadelphia
April 12	Executive Committee	Philadelphia

Malleable Symposium Reprinted

The Symposium on Malleable Iron Castings has been reprinted in pamphlet form. This pamphlet is composed of 122 pages of critical data and valuable information on the properties of malleable iron and malleable iron castings. Copies can be obtained from Society Headquarters. The price is 75 cents.

Hugh P. Tiemann

1879–1932

The death on January 4 of Hugh P. Tiemann has removed from Society ranks a most loyal and active member. He was graduated from Columbia University in 1900 and soon thereafter became associated with the Carnegie Steel Co. His connection there was continuous until his death; for a number of years he was assistant metallurgical engineer. One of his outstanding achievements was the writing of a comprehensive encyclopedia, "Iron and Steel."

His record of service with this company is paralleled from 1910 by his activity in the Society. For many years he was a member of Committee A-1 on Steel. As a member of the Advisory Subcommittee and other subcommittees, he contributed much of his time and intimate knowledge of metallurgical problems to the work of the Society. He was chairman of the Subcommittee on Steel Forgings and Billets for more than 15 years. He was a member-at-large of Committee E-8 on Nomenclature and Definitions, and his interest and experience in precise thinking and expression were invaluable in the work of the Editorial Committee of which he was a member. From his wealth of experience in the steel industry these committees drew much benefit.

His record of service with his company and in this Society are indicative of his character. His associates in the work of the Society will miss his presence, but realization of his service and interest will remain.

The Society in the Year 1931

A Review of the Major A.S.T.M. Activities in the Past Year

IT is always interesting to take an inventory. It is especially so when your stock taking shows that you have had a successful year. Whether that be the case or not, a stock taking or a review of your year's activities is valuable—in no other way can you gain a true conception of how you have progressed over a period of time.

When a company or organization can look back over its record of a year and report a successful one, it is gratifying. It is particularly so in a year of national sub-normal activity. The record of our Society in 1931 is noteworthy. In truth, the A.S.T.M. has had a banner year in many respects.

Meetings and Symposiums Were Outstanding

In no previous year did the Society have so many meetings of outstanding interest and which attracted such large attendance. The annual meeting in Chicago, the second in the Society's history to be held in the Midwest, was the outstanding meeting the Society has ever held. The fact that it was held in an industrial center, the wealth of valuable papers presented and the Society's first exhibit of testing apparatus were reasons for a registration which exceeded by several hundred that at any previous meeting. Several of the sessions were joint ones with other societies. These included the session in which the Symposium on Malleable Iron Castings was held, with the American Foundrymen's Association and the A.S.T.M. as joint sponsors; the one in which the Symposium on the Economic Significance of Specifications for Materials was held, with the Western Society of Engineers; and the outstanding sessions of the meeting, the two in which the American Society of Mechanical Engineers and the A.S.T.M. cooperated to hold a Symposium on the Effect of Temperature on the Properties of Metals. In this, there were 27 papers written by 38 authors. An idea of the extensiveness of the Symposium can be gained from this fact—the book which comprises these papers and the discussion thereon, contains more than 825 pages. The data therein is of inestimable value to the engineering profession.

Economics of Specifications; Exhibit of Testing Apparatus

The Symposium on the Economic Significance of Specifications for Materials was of unusual interest. This session was the first of any A.S.T.M. meeting devoted to the economic significance of its work. Many laudable comments have been received on this meeting and it is evident that discussions on this and related subjects are of much importance if we are to fully promote the usefulness of the Society's work.

The Exhibit of Testing Apparatus and Machines was the first ever sponsored by the Society. Limited to testing equipment, it brought home to those who attended the meeting the great amount of apparatus available in the fields of the Society's work. There were several booths sponsored by leading research institutions and organizations in which special equipment, not commercially produced, was on display. A description of the major pieces of apparatus in the various booths covers 73 pages of a journal issued by a society interested in the scientific instrument field. This is indicative of the exhibit's comprehensiveness.

Regional and Local Meetings

At the Regional Meeting in Pittsburgh in March, a Symposium on Welding was held with the Pittsburgh Section of the American Welding Society cooperating. A splendid registration rewarded the efforts of the Pittsburgh District Committee which arranged the meeting. The New York District Committee sponsored two local meetings during the year. At the first one in March, there was a very worth while discussion of the "limitations of the present knowledge of engineering materials." The second was devoted to a discussion of preservative coatings for structural materials, the program being sponsored by A.S.T.M. Committee D-1. The Detroit District Committee sponsored a joint local meeting with the A.S.S.T. in May which was well attended. These local meetings are of much value and fill a need which neither the regional nor annual meeting can do, namely, a more intimate contact of our members and their friends and associates in the regions served by the district committees.

During the year, one new district committee was organized. The Cleveland District Committee was organized in May and is arranging to hold a regional meeting of the Society there in March of this year. With two other industrial centers relatively near, Akron and Youngstown, a division of the general district committee was formed in each. Likewise, when the Chicago District Committee was reorganized in June, a Milwaukee Division was formed. With district committees now active in New York, Detroit, Chicago, Pittsburgh and Cleveland and three on the West Coast, Society activities should be brought to the fore in these regions and the members there will be kept more closely in touch with A.S.T.M. work.

Committees and Their Work

In any year, the activities of the many standing committees are reflected in the general inventory at the end of the year. In a year of unusual activity for the Society as a whole, it can be expected that the committees, too, will have been very active, since they directly contribute so much to general Society work.

During the year, the total of standards and tentative standards reached 623, of which 443 were standards and 180, tentative standards, an increase of 16 and 15 respectively over the number for 1930. Committee E-10 on Standards organized in 1930, has functioned very successfully in its scope of reviewing progress of A.S.T.M. standardization work and approving new tentative standards.

A new committee, C-12 on Mortars for Unit Masonry was organized during the past year and has a very extensive program of work ahead of it. This will soon be under way, with the formation of the various subcommittees in progress. Groundwork has been laid for the organization of a new standing committee on water analysis, with the appointment of a temporary chairman and the formulation of a plan of organization and scope.

A Sectional Committee on Sieves for Testing Purposes was organized under A.S.A. procedure in December, with the A.S.T.M. and National Bureau of Standards as joint sponsors, as announced on page 3 of this BULLETIN.

A change in the scope of Committee C-4 has been decided upon and work on the reorganization of this committee which hereafter will be known as Committee C-4 on Clay Pipe and the formation of Committee C-13 on Concrete Pipe, a new standing committee, was begun late in the year. This is also announced on page 3 of this issue of the BULLETIN.

Details of the outstanding research projects of the com-

mittees of the Society appeared in the October BULLETIN. This extensive article is well worth study, if a knowledge of A.S.T.M. research work is desired. The more important developments of committee work during 1931 are described in the part of this review article which follows. An attempt has been made to present the information in such a way that a reader interested in a specific field or fields of work can refer directly to these.

General

The Symposium on Malleable Iron Castings, mentioned above, is a valuable contribution to the foundry industry and those who use malleable iron castings. It brought to light a great deal of hitherto unavailable data and correlated the information and knowledge of leading authorities and companies in this field. A Symposium on Weathering Characteristics of Masonry Materials brought out the available information on this subject and further emphasized those phases which require further study. The Abrasion Testing of Rubber was the title of another symposium which is of great interest in the rubber field. One session of the annual meeting was devoted to this. Many valuable papers on other subjects were presented at the annual meeting.

The Sixth Edgar Marburg Lecture was delivered by Dr.-Ing. A. Nadai on the subject "Phenomenon of Slip in Plastic Materials." This is a subject on which more and more importance is being placed as engineers and physicists dig more deeply into the causes of failures in mechanical constructions and the mechanism covering rupture in solid materials.

The fifth award of the Charles B. Dudley Medal was made to Dr. A. H. Pfund for his paper on "Hiding Power Measurements in Theory and Application" presented before the 1930 annual meeting. The paper by Dr. Pfund as signified by the award of the Dudley Medal is of outstanding merit as an original contribution on research in engineering materials.

The first International Congress of the New International Association for Testing Materials was held in Zurich in September. Several members of the A.S.T.M. took a prominent part in the congress and contributed papers.

Research

The Joint Research Committee on Effect of Temperature on the Properties of Metals, in addition to sponsoring the Symposium mentioned earlier, has carried on quite actively an extensive research program. A good start has been made in tests designed to compare mechanical properties and structural stability of cast and wrought steels. A study of long-time heating upon the mechanical properties and structural stability of stainless steels, containing 18 per cent chromium, 8 or 10 per cent nickel and with different carbon contents, is well advanced. Progress is also reported in the development of a test code for high-temperature tension tests.

A preliminary report on repeated stress (fatigue) tests at different temperatures on a low-carbon steel carried out at the University of Illinois by H. F. Moore and N. J. Alleman is appended to the current report. Difficulties encountered in developing apparatus for endurance testing at low temperatures are described by H. W. Russell and W. A. Welcker, Jr., in another appendix entitled "Apparatus for Low-Temperature Endurance Testing." F. H. Norton and J. B. Romer have described "New Creep Testing Apparatus at the Massachusetts Institute of Technology."

A simple and inexpensive test method for investigating the plastic behaviour of metals at elevated temperatures by an analysis of the curvature produced in an initial flat strip by heating is described by Howard Scott in a paper entitled "High-Temperature Characteristics of Metals Revealed by Bending."

The Research Committee on Yield Point of Structural Steel has extended its work by a study of the relation of rate of strain of specimens to speed of testing machine and has submitted some interesting results in its report this year.

The Research Committee on Fatigue of Metals is continuing its publication of abstracts of articles on fatigue of metals appearing in various technical publications both American and foreign and is extending its summaries of the present day knowledge of fatigue. Summaries of the knowledge of corrosion fatigue and discussion of the significance of fatigue test results to the structural engineer and machine designer are also in preparation.

Data on fatigue strength in shear of copper, brass and duralumin reported by H. F. Moore and R. E. Lewis in a paper entitled "Fatigue Tests in Shear of Three Non-Ferrous Metals" are a valuable contribution in view of the few test data available in this field. A study by J. B. Kommers on "The Static and Fatigue Properties of Brass," showed the effect on these properties of various kinds and amounts of cold working.

The properties of engineering materials to dissipate energy when subjected to cyclic stresses below the fatigue limit is known as damping capacity or magnetic hysteresis effect. In describing several methods of determining damping capacity, G. S. von Heydekampf in his paper "Damping Capacity of Materials," explains the significance of this property.

A method for determining the fatigue limit of wire in its structural shape and condition is described in a paper by S. M. Shelton on "Fatigue Testing of Wire." In a paper on "Fatigue Tests of Weld Metal," R. E. Peterson and C. H. Jennings discussed welded joints.

Steel and Alloy Steel

The Committee on Steel presented to the Society early in the year new tentative specifications for structural steel for ships which met the demands of the inspection societies, ship builders, and Government codes. Specifications covering five different types of fabricated pipe, namely, riveted steel and wrought-iron pipe, lock-bar steel pipe, forge-welded steel pipe, electric-resistance-welded steel pipe and electric-fusion-welded steel pipe, were completed during the year and accepted as tentative. The Standard Specifications for Alloy-Steel Bolting Material for High-Temperature Service was extensively revised to include material up to 7 in. in diameter.

Specifications for structural rivet steel to supersede when adopted the rivet requirements in the present standard specifications for structural steels have been completed. The committee has given serious consideration to methods of determining area, the limits on weight variations and to the so-called machining clause in the Standard Specifications for Billet-Steel and Rail-Steel Concrete Reinforcement Bars. Revisions of these specifications were published as tentative and will be given further consideration.

As a result of a request from the Boiler Code Committee of the American Society of Mechanical Engineers, the Specifications for Steel Plates for Forge Welding have been extended to include requirements for firebox quality material as well as flange quality. The list of A.S.T.M. specifications published last year covering steel suitable for fusion welding has been supplemented and republished. Consideration is being given to specifications for boiler and firebox steel, also rivets and rivet steel of a higher tensile strength.

The Committee on Iron-Chromium, Iron-Chromium-Nickel and Related Alloys, although still a fact-finding and research group, is now directing attention to standardization of some of the most widely used alloys falling within its scope. Considerable progress has been made in the collaborative corrosion studies being carried out by 15 laboratories on the du Pont acid-immersion test, the Navy Department salt-spray test and the copper-sulfate stain test.

Wrought, Cast and Malleable Iron

The Committee on Wrought Iron recommended the tolerance in weight of double extra-strength pipe in the Standard Specifications for Welded Wrought-Iron Pipe be increased from 5 per cent to 10 per cent. An extensive revision in the Standard Specifications for Staybolt, Engine-Bolt and Extra-Refined Wrought-Iron Bars and a change in the definition for double-refined iron were recommended as tentative. The committee is making a collection of information on what constitutes quality in wrought iron.

Committee A-3 on Cast Iron has been engaged in planning and carrying out an extensive investigation on impact testing of cast iron. The newly appointed Subcommittee on Automotive Castings is canvassing the producers and consumers of such castings by means of a questionnaire to determine its scope of work. The Subcommittees on Correlation of Test Bar and Casting, and on General Castings, are doing work to determine whether or not more than one arbitration bar is necessary. Members of the subcommittees have carried on tests with various sizes of test bars and three reports are appended to the current report of the committee: namely, one by Hyman Bornstein on "A Comparison of Various Sizes of Test Bars Representing Cast Irons from Five Foundries," another by J. T. MacKenzie on "Tests on Cast-Iron Specimens of Various Diameters," and the third by J. W. Bolton on "Correlation of Cast-Iron Test Bar and Casting by Volume-Surface Ratio."

Committee A-7 on Malleable Iron Castings has proposed a revision of the Standard Specifications for Malleable Castings. The proposed specifications include two grades designated by numbers of five digits: namely, grades Nos. 32510 and 35018. Grade 32510 is identical with the present standard specifications, while grade 35018 covers a higher strength product for railroad work and those industries requiring metal having a minimum elastic limit of 35,000 lb. per sq. in., an elongation of 18 per cent in a gage length of 2 in., and a minimum tensile strength of 53,000 lb. per sq. in.

This committee has under development a specification for cupola malleable castings for flanges, pipe fittings and valves, and a proposed research on causes of embrittlement in malleable castings for galvanizing purposes.

Magnetic Testing

Committee A-6 on Magnetic Properties has submitted as tentative a procedure for testing at very low inductions with alternating currents to replace the present standard when adopted. Experimental work is in progress looking toward the development of a suitable method for testing with high magnetizing fields and for determining the suitability of existing methods.

Committee A-8 on Magnetic Analysis has under consideration the determination of fundamental data on the magnetic properties of various commercially important steels and has also undertaken a critical survey of the literature on magnetic analysis. The investigation on the relation of magnetic properties and toughness as indicated by the results of impact tests has been completed and was reported in the paper by Haakon Styri entitled "Relation Between Magnetic Properties, Impact Strength and Hardness."

Studies of "Thermomagnetic Analysis and the A_0 Transformation in 0.75-per-cent Carbon Steel" by R. L. Sanford and G. A. Ellinger indicate that this method shows great promise for studying the strength of steel and the transformations associated with its heat treatment.

Corrosion of Iron, Steel and Non-Ferrous Metals

The Committee on Corrosion of Iron and Steel reports results of the first inspections after 102 weeks exposure at five test locations of the metallic coatings on specimens of hardware, structural shapes, tubular goods, etc. The coatings included electrogalvanized, hot-dip galvanized, hot-dip aluminum, cadmium plate, lead plate, gas and electric sherardized, calorized and amaloy. Another series of tests is now being undertaken on coatings applied under defined conditions and of known and uniform thickness as representing the advancement in the art of electroplating.

Studies of methods of testing are being continued looking toward the development of a laboratory test which will predict service in the atmosphere. Work is being confined to the simulated industrial atmospheric test although the influence of salt spray is being considered. The corrosion immersion tests previously started in sea water at Key West, Fla. and Portsmouth, N. H. and the rivet plate tests at these locations and also at Port Arthur, Tex. were inspected at frequent intervals. Studies of an acid immersion test to determine whether consistent results can be obtained in testing iron and steel sheets in 20-per-cent sulfuric acid have been conducted. The results indicate that an acid test conducted as described is not capable of consistent repetition and the data confirm previous statements of the committee that such a test should not be used to forecast the relative life of ordinary ferrous material in the atmosphere.

Considerable progress has been made in the research on embrittlement of hot-galvanized structural steel which is sponsored by Subcommittee X. This is outlined on another page of this BULLETIN.

On the recommendation of the Sectional Committee on Zinc Coating of Iron and Steel, the Standard Specifications for Zinc-Coated (Galvanized) Sheets were approved by the American Standards Association as an American Tentative Standard. The sectional committee has continued its studies of hot-dipped, galvanized hardware products and consideration has been given to the preparation of specifications for sherardized, electrogalvanized and Shoop process coatings.

The exposure test program of Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys is under way. Sixteen thousand test specimens which have been collected and distributed to the various test locations are in position on the test racks. The specimens, of twenty-four non-ferrous metals and alloys which are representative of this field, include two varieties of commercial copper, two compositions of brass, aluminum bronze, tin bronze, manganese bronze, admiralty metal, two types of copper-nickel alloys, copper silicon alloys, commercial nickel, monel mental, five different types of aluminum alloys, three grades of zinc, two compositions of lead, and commercial tin. Atmospheric specimens are being exposed at nine test locations.

Non-Ferrous Metals and Alloys

Committee B-2 on Non-Ferrous Metals and Alloys has been active and has through its Subcommittee on Chemical Analysis prepared Method of Chemical Analysis of Silver Solders which have been published as tentative. Studies are also being made on the present standard and tentative methods of analysis of non-ferrous metals.

Committee B-4 on Electrical-Heating, Electrical-Resistance and Electric-Furnace Alloys has prepared Specifications for Nickel-Chromium Wire and Iron-Nickel-Chromium Wire for Electrical Heating Elements, and a Method of Test for Determining the Temperature-Resistance Constants of Resistance Alloys of the manganin and constantan types which have been issued as tentative standards.

An investigation of a bend test for determining the elastic properties of alloys at temperatures up to 1000° C. is being carried on in four laboratories. The committee is considering the advisability of preparing methods of test for thermostat metals and thermocouple alloys.

Methods of test for tensile strength, thermal conductivity, warpage and thermal coefficient of linear expansion, for wrought and cast alloys for use at high temperatures in electric furnaces are in course of preparation.

Committee B-5 on Copper and Copper Alloys, Cast and Wrought has continued its systematic study of sand casting

alloys in cooperation with the Non-Ferrous Ingot Metal Institute. This study has resulted in a further revision of the Specifications for Copper-Base Alloys in Ingot Form. Specifications for Copper Water Tube are in preparation.

Committee B-6 on Die-Cast Metals and Alloys in presenting its first report offered two new tentative specifications, one covering aluminum-base alloy die castings, and the other for zinc-base alloy die castings prepared as a result of data and knowledge obtained in the comprehensive studies of 13 commercial compositions of aluminum-base alloys produced by 5 plants and on 9 zinc-base alloys as cast by 6 producers. An investigation of tin and lead-base die-casting alloys is in the preliminary stages of planning and is expected to cover representative alloys in commercial production. The status of this class of die casting in the industry is presented in a paper entitled "Lead-Base and Tin-Base Alloys for Die Castings" by Fred J. Tobias. In a study of the "Effect of Composition on Aluminum-Base Die-Casting Alloys," D. L. Colwell discusses factors that enter into the production of successful die castings.

Committee B-7 on Light Metals and Alloys, Cast and Wrought has prepared complete revisions of Specifications for Aluminum-Base Sand-Cast Alloys in Ingot Form and Aluminum-Base Sand Castings which have been adopted by the Society as standard. These specifications cover the field of casting alloys for a wide variety of purposes from the manufacture of patterns to highly stressed structural parts such as pistons and crankcases for combustion engines.

Specifications have been adopted for aluminum alloy sheet of the duraluminum type and aluminum-manganese sheet. These two specifications, together with the specifications for aluminum sheet permit a wide choice of material wherever the application of light-weight sheet is desired. Specifications for Aluminum Alloy Wire, Rods and Bars, for Magnesium-Base Alloy Sheet and for Magnesium-Base Alloy Wrought Shapes (Other than Sheet) are in preparation.

Metallography

Committee E-4 on Metallography has under consideration a revision of the Standard Methods of Metallographic Testing of Iron and Steel and of Non-Ferrous Metals and Alloys. To the latter it is proposed to add special paragraphs covering the preparation and etching of specimens of lead and lead alloys, such as those used in the manufacturing of cable sheath. Thorough studies are being made of lens combinations to be added to the Standard Rules Governing the Preparation of Micrographs of Metals and Alloys. A special Committee on Grain Characteristics of Steel has been appointed. In addition to the work on spheroidizing of tool steels, attention will also be given to the preparation of grain size charts for carburizing steel, for forging steels, for tool steels and possibly sheet steels at a later date.

Cement, Gypsum and Lime

Committee C-1 on Cement has continued active study along the plans made in the preceding year. The Subcommittee on Portland Cement is studying such subjects as relation of the particle size to physical properties, accelerators and retarders, plastic mortar strength test, durability, volume change, age tests, and chemical composition. In cooperation with some of the consumers, considerable work has been done in the field to obtain more data on the effects of temperature of cement at the time of use.

The investigation of masonry cements was continued and the Subcommittee on Masonry Cements prepared a specification which was approved by Committee C-1 and has been submitted to the Society for consideration through Committee E-10 on Standards.

The committee, with the approval of the Executive Committee of the Society, has recently appointed a Technical Assistant whose duty is to keep the committee and the interested public informed on the status of, and development in, cement specifications and methods of test.

Committee C-11 on Gypsum during the past year submitted new Tentative Specifications for Gypsum Wall Board and Gypsum Lath. A revision was also made in the Tentative Specifications for Gypsum Sheathing Board and a proposed revision of the Standard Methods of Testing Gypsum and Gypsum Products.

Investigations of the use of gypsum and anhydrite as a retarder for portland cement are being continued. Further investigations on the suitability of the modified Vicat apparatus for determining the standard consistency of gypsum ready-sanded plaster and gypsum wood-fiber plaster indicate that this apparatus will be suitable if the weight of the plunger is increased.

Due to the variation in effect of different types of positive accelerators when added to neat plaster to determine the time of set, it is felt that there is little promise of finding one that is satisfactory. Tests, therefore, are being conducted by different investigators on neat plaster with and without standard testing sand. Various methods of determining the sand content of set plaster are being investigated. The ammonium acetate method suggested by Dr. L. S. Wells bears much promise.

Committee C-7 on Lime has completed a thorough canvass of its personnel and a review of its activities which has stimulated interest in the important subjects under its jurisdiction and has resulted in the introduction of new projects. Revisions were made in the Standard Specifications for Hydrated Lime for Structural Purposes and in the Tentative Specifications for Sand for Use in Lime Plaster. Consideration is being given to the preparation of specifications for lime for the manufacture of glass and calcium arsenate. A new subcommittee has been formed on research which will give consideration to many new problems.

Brick and Refractories

Committee C-3 on Brick approved the advancement to standard of the Tentative Methods of Testing Brick. The problem of resistance to weathering has engaged the attention of the committee for the past year and laboratory investigations are being carried out. A review of the knowledge of weathering of structural clay products was contributed by J. W. McBurney as part of the Symposium on Weathering Characteristics of Masonry Materials. A bibliography on the weathering of structural clay products was also compiled by D. E. Parsons.

Committee C-8 on Refractories has approved the flexure test described in the Tentative Methods of Testing Brick for use in testing refractories. Revisions have been proposed in the method of test for porosity and volume changes in refractory materials and in the test for softening point of fire-clay brick. A revision of the softening point test was also advanced to standard, and the tentative method of test for spalling action was revised. Definitions of the terms "spalling" and "pyrometric cone equivalent" were advanced to standard.

A study of the abrasion of refractories at high temperature has been continued at Pennsylvania State College. The section on temperature has again made a critical study of the P. C. E. test, and it has been found that there is a necessity for still further testing work preferably on the three existing types of furnaces by one laboratory. In the study of heat transmission of refractories, the construction of a calorimeter for testing refractory insulation is in progress and work is being done on the determination of thermal conductivity at Mellon Institute.

A study of 23 brands of fire-clay brick by various methods for determining the resistance to spalling action is described in a paper by R. A. Heindl entitled, "Comparative Tests for Determining Resistance of Fire-Clay Brick to Thermal Spalling."

Masonry Building Units

Committee C-10 on Hollow Masonry Building Units recommended immediate revision of the Standard Specifications for Hollow Burned-Clay Load-Bearing Wall Tile; Fire-Proofing Partition and Furring Tile; Floor Tile and Definition of Terms Relating to Tile, which consisted in deleting the requirements pertaining to fire resistance and a change in the designation of hollow-clay building units by substituting the words "structural clay tile" for the expression "hollow burned-clay tile" or "hollow tile."

Three extensive papers on the general subject of masonry building units were a valuable contribution to the literature on this subject. An analysis of test results on specimens of clay hollow units by D. E. Parsons entitled, "Specifications for Hollow Masonry Building Units," indicated that factors other than strength properties of the units have a marked influence on wall strength. F. E. Richart, E. M. Woodworth and R. B. B. Moorman, in presenting results of tests of 60 walls, 6 ft. long by 9 ft. 6 in. high and 42 small walls, 2 ft. 8 in. long and 4 ft. high in a paper entitled "Tests of Stability of Concrete Masonry Walls" showed that the compressive strength is dependent upon the strength of the units. A systematic and comprehensive investigation of the load-carrying and fire-resistant properties of walls of concrete masonry units was reported by C. A. Menzel in a paper on "Tests of the Fire Resistance and Stability of Walls of Concrete Masonry Units." Results of these tests also showed a linear relation between the strengths of the walls and units before and after exposure to fire.

Concrete and Concrete Aggregates

Committee C-9 on Concrete and Concrete Aggregates has presented another extensive report on the results of its year's work on a number of important problems. Standardization accomplished during the year included five new tentative specifications for curing portland-cement concrete, and test methods for structural strength of fine aggregate and for apparent specific gravity of coarse aggregates.

The specifications for concrete aggregates have been revised as have the methods of securing specimens of concrete from structures and the methods of making and storing compression specimens in the field. Since the annual meeting, methods for making accelerated soundness tests for both fine and coarse aggregates using sodium sulfate as the destructive agency have also been issued as tentative. Studies are being made of the effect of accelerated freezing and thawing of aggregates looking toward the development of a test procedure. Of interest in this connection is the paper by F. C. Lang and C. A. Hughes on "Accelerated Freezing and Thawing as a Quality Test for Concrete Aggregates."

The committee is paying major attention at this time to conditions affecting the durability of concrete. The causes of failures are being investigated by studying concrete structures which have failed and also those which have withstood exposure over a long period of time. The annual report contains a suggested Terminology Applying to the Study of Concrete Structures in Service. Ephrem Viens presented a paper on "The Performance of Concrete in Exposed Structures" as part of the Symposium on Weathering Characteristics of Masonry Materials. Included in the symposium also are papers on the weathering of aggregates and concrete.

As a further step in securing concrete of the design quality, considerable attention has been paid to methods of curing and has resulted in a general report on the subject including two digests, one on available information on the use of calcium chloride for curing, and the other on the effect of curing methods on strength. These studies resulted in the five specifications for curing concrete mentioned previously.

Particular attention has been paid to methods of analyzing concrete in both the fresh and hardened conditions. A method of determining the cement content of a hardened concrete by chemical methods of analysis was issued as tentative. Considerable supporting data on the method and a bibliography prepared by H. F. Kriege is appended to the report. A test has been proposed by W. M. Dunagan in which the relative amounts of water, cement, and fine and coarse aggregates present in a fresh concrete may be obtained in the field with a reliable degree of accuracy by means of the buoyancy principle.

Attention is being paid to the factors which affect elasticity and volume changes and to methods for their measurement. A paper by P. M. Noble entitled "The Effect of Aggregate and Other Variables on the Elastic Properties of Concrete" appended to the report gives some interesting comparisons of mid-western aggregates.

A subcommittee on ready-mixed concrete is engaged at present in the preparation of suitable purchase specifications. Particular attention is being paid to methods of measurement and delivery and to the inspection testing and acceptance of ready-mixed concrete. An interesting study of the relation between strength and time of retention in the mixer has been contributed in a paper by the late W. A. Slater on "Tests of Concrete Conveyed from a Central Mixing Plant" which presents data on ready-mixed concrete transported for periods from two minutes to 2½ hours in a closed rotating drum without mixing blades.

Extensive studies of paving concrete made by the U. S. Bureau of Public Roads are described by F. H. Jackson and W. F. Kellermann in a paper entitled "Studies of Paving Concrete." A unique device for measuring the flow of concrete mixtures is described by D. M. Burmister in his paper "The Concrete Flow Trough." A discussion of the general theory regarding the use of dry powdered admixtures in concrete and their effect upon the water-cement ratio is given in the paper entitled "Crystalline Talc as an Admixture in Concrete" by F. R. Wicks.

Road Materials

Committee D-4 on Road and Paving Materials has undergone a complete reorganization, and which, while temporarily retarding work, will expedite it in the future. Revisions were proposed in the terms bitumens, asphalts, tars and pitches appearing in the Standard Definitions of Terms Relating to Materials for Roads and Pavements. The Subcommittee on Specifications for Road Oils prepared a group of proposed specifications for slow curing road oils, for medium curing road oils, for hot application road oils and for cut-back asphalts. The specifications which are published for information were prepared after a rather extensive study of existing materials and specifications.

An able presentation of the subject of emulsions of the quick-setting type has been made by C. L. McKesson in a paper on "Modern Paving Emulsions, Types, Characteristics and Test Methods."

Paints and Petroleum Products

Committee D-1 on Preservative Coatings for Structural Materials has adopted new Tentative Specifications for Acetone and Methods of Test for the Tinting Strength of Pigments and the Testing of Nitrocellulose Clear Lacquers and Lacquer Enamels. Changes have been made in the Standard Specifications for Red Lead and Basic Carbonate White Lead, as well as in the Tentative Specifications and Tests for Soluble Nitrocellulose and the Tentative Methods of Sampling and Testing Lacquer Solvents and Diluents. The Specifications for Aluminum Powder, Gold Bronze Powder and for the Toxic Ingredients in Anti-Fouling Paints have been made standard as well as six methods of test covering several phases of the committee's activities.

During the year the cooperative work on the determination of the tinting strength of pigments was completed and the interest of the group working along that line was transferred

to an effort to work out a satisfactory method for accurately measuring the hiding power of paints. This general subject was represented on the program of the annual meeting by papers on "The Photo-electric Cryptometer" by A. H. Pfund, this year's Dudley Medalist and "The Hiding Power of White Pigments" by G. S. Haslam and D. L. Gamble.

A new subcommittee was authorized to undertake work which would develop specifications for pipe priming coatings for mill application and is now being organized. Other items of interest are specifications for putty, shellac, turpentine and lacquer materials which are in preparation.

Committee D-2 on Petroleum Products and Lubricants has conducted a review of the present methods of testing and has recommended revisions in the Standard Tests for Viscosity of Petroleum Products and Lubricants, Distillation of Gasoline and Similar Petroleum Products, Cloud and Pour Points and Distillation of Natural Gas Gasoline. Revisions have also been made in the Tentative Method of Test for Vapor Pressure of Natural Gasoline and in the Definition of Fuel Oil.

Technical Committees on Gasoline and on Motor Oils have been active during the year in a study of the relation between test data and performance in service with the idea of using the information and knowledge obtained as a basis for specifications.

A method for vacuum distillation is under consideration and the Subcommittee on Crude Petroleum is studying the desirability of developing apparatus and procedure for the evaluation of crude petroleum. The determination of the gravity of crude petroleum on the dry basis is being studied.

Fire Tests

Committee C-5 on Fire Tests of Materials and Construction is developing methods for fire tests of untreated and chemically-treated wood. A proposed method was published in the 1930 committee report. A new form of testing apparatus has been developed at the Forest Products Laboratory, Madison, Wis., and several of these have been placed in the hands of experimenters and testing bodies who have had experience with similar methods. The committee has had opportunity to review and digest data developed by some of these testing bodies and expects shortly to receive other compilations of this kind for study. A new subcommittee has been formed to consider methods for fire tests of wall opening protectives.

The committee is also reviewing and giving consideration to methods which have been in commercial use in the past, with a view to reaching conclusions in the extent to which the recently-developed equipment may practicably supplant, or should be recommended for use in connection with, equipment and methods which have been in vogue heretofore.

Timber and Shipping Containers

Committee D-7 on Timber has continued its study of apparatus for determining the moisture content of timber and announces that the blinker type apparatus developed at the Forest Products Laboratory has reached a stage of commercial development. Other instruments are being studied. The Tentative Specifications for Timber Piles are under active consideration by the committee. The Subcommittee on Timber Preservatives has under consideration a revision of the Standard Method of Test for Distillation of Creosote Oil as a result of work carried on in cooperation with the American Wood Preservers Association, and the American Railway Engineering Association.

Committee D-10 on Shipping Containers, although it did not present a report last year, has spent most of its effort in revising the present specifications and preparing specifications and methods of test for other types of containers than those considered in the past.

The Subcommittee on Fiber and Corrugated Fiber Containers has given its attention primarily to methods of testing. Consideration has been given to development of tests of materials and standardization of present tests of containers. The Subcommittees on Nailed and Lock-Corner Boxes, and on Wirebound Containers have given most of their attention to revising the present specifications to make them conform with the technical requirements of the Specifications of the Federal Specification Board.

The Subcommittee on Wooden Crates has prepared proposed definitions of terms used by crating interests. Proposed specifications for cleated plywood boxes have been prepared. A new subcommittee on commodity classification has been organized.

Bituminous Waterproofing and Roofing Materials

Committee D-8 on Bituminous Waterproofing and Roofing Materials prepared a complete revision of the Methods of Testing Asphalt Roll-Roofing Surfaced with Fine Talc, Granular Talc or Mineral Granules; Likewise, Asphalt Shingles Surfaced with Mineral Granules. The Subcommittee on Refined Ductility Tests for Roofing Materials has completed a series of ductility tests on four types of asphalts. The study of an electrical accelerated weathering test applicable to roofing is also underway, and results are reported on two types of asphalts. Two new subcommittees have been appointed, one on Bituminous Joint Compounds for Sewer Pipe and the other on Coefficient of Expansion of Bituminous Materials.

Electrical Insulating Materials

The Committee on Electrical Insulating Materials has been very active in the development of new methods of testing and in the improvement of the present standard and tentative standard methods and also in drafting preliminary specifications. The sampling procedure for electrical insulating oils was revised and changes were also made in five tentative methods of testing.

The subcommittee on molded insulating materials is investigating the effect of specimen mould design on the test results. A study of impact fatigue on molded materials is also being made.

The subcommittee on sheet insulation is developing tests applicable to rods and tubes. The effect of conditioning on mechanical and electrical tests is under study.

Two very promising methods of determining neutralization value of oils are under consideration. A description of the test procedures is appended to the current report. Life and short-time sludge tests also continue to receive attention.

The subcommittee on solid, filling and treating compounds has undertaken to write test methods for this general type of material.

The work on electrical tests includes studies on methods of measuring power factor, electrical resistivity, and thermal conductivity of electrical insulating materials. A special section on varnished cloth is working on specifications covering varnished cloth tape for insulating cables and electrical conductors. A new subcommittee has undertaken to prepare test methods on condenser mica and on pasted mica.

Coal and Coke

Committee D-5 on Coal and Coke recommended for advancement to standard the Tentative Method of Test for Size of Anthracite with a revision in the location of sampling points for collecting samples of anthracite from tops of loaded cars.

The Subcommittee on Nomenclature and Definitions is working on definitions of the terms "net calorific value" and "gross calorific value." The subcommittee has also devoted considerable attention to formulating an acceptable definition of the term "coke."

The Subcommittee on Agglutinating Value is investigating the effects of various factors on the agglutinating value test

for coal with a view to standardizing a test procedure. The test is intended to give information regarding coking and caking properties of coals. The experimental work is being conducted at the Pittsburgh station of the U. S. Bureau of Mines with the aid of a Carnegie Institute of Technology fellowship supported by the National Coal Association.

The Subcommittees on Coke, Sampling, Foundry Coke Specifications, and Pulverizing Characteristics of Coal have reported progress in the work assigned them.

Rubber Products and Textile Materials

Committee D-11 on Rubber Products has prepared new Tentative Specifications for Rubber Pump Valves to supersede the present standard specifications, which were withdrawn. Revisions were proposed in the Standard Methods of Testing Rubber Products and the Tentative Specifications for Insulated Wire and Cable, for Steam Hose and Methods of Chemical Analysis of Rubber Products were revised. A new Subcommittee on Dynamic Fatigue Testing for Rubber Products was created to study the more general field indicated in its name. Specifications covering methods of test of rubber belting for power transmission and performance specifications covering insulating wire have been prepared in preliminary form. Progress is being made in the preparation of specifications for linemen's blankets. A thorough study and revision of the Specifications for Friction Tape for General Use for Electrical Purposes and the Tentative Specifications for Rubber Insulating Tape is being considered. The Subcommittee on Life Tests has in preparation methods for carrying out the Geer oven aging and Bierer oxygen bomb tests.

Committee D-13 on Textile Materials has brought out four new specifications during 1931; namely, tentative Specifications for Enameling Duck for the Tire Industry, for 0.007-in. Cotton Tape, Specifications and Test Methods for Cotton Goods for Rubber and Pyroxylin Coating, and a Method for Determining Relative Humidity. Important revisions have been made in the specifications covering electrical silk and cotton tapes, asbestos yarns, rayon, chafer tire fabrics and asbestos tape for electrical purposes.

Considerable work is in progress which will result in revisions of present specifications and the development of new ones. Among the materials being studied are raw cotton, tubular braided sleeving, acid or alkaline content in cotton tapes and holland cloth. Machines for measuring abrasion and for determining bursting strength of knit goods are being investigated. A complete review of the various test methods and of the definitions and nomenclatures appearing in the specifications is being made. Standard yarn tables are being studied with a view to a complete revision based on more accurate data now available. Performance test methods for rayon fabrics, methods for determining small quantities of copper, manganese, etc., and for warp size are in progress.

A new Subcommittee on Silk has been organized and is undertaking a study of the applicability of present methods to the testing of silk fabrics.

Thermometers

Committee D-15 on Thermometers has recommended a note of caution be added to the specifications for the high-distillation thermometer as it has been called to their attention that under some test conditions, the bulb of the thermometer may be heated to a point that will impair the accuracy of the instrument and throw such accuracy beyond the tolerances permitted by specifications.

Slate and Building Stone

The activities of Committee D-16 on Slate during the past year have been centered upon perfecting the methods of test for water absorption and for flexural strength of slate. The methods have been revised and advanced to standard. Revisions of the absorption tests resulted from a cooperative study at five testing laboratories on seven different samples of slate. The possibility of developing information on slate through the use of X-rays is being considered.

Studies are being made of the weathering characteristics of slate to see whether or not tests similar to those applied to other building materials can successfully be applied to slate. This is covered in papers by G. F. Loughlin on "The Weathering of Natural Building Stone," and C. H. Behre, Jr., on "The Weathering of Slate," presented in connection with the Symposium on Weathering Characteristics of Masonry Materials.

Committee D-18 on Natural Building Stones has completed the preparation of new Tentative Methods for Modulus of Elasticity and for Shear Testing of Natural Building Stones and Definitions of Terms Relating to Natural Building Stones, which were issued as tentative. Revisions were also made in the Tentative Methods of Compression Testing, of Flexure Testing, and of Absorption and Apparent Specific Gravity of Natural Building Stones. Studies are being made of various fatigue and thermal tests applicable to building stone. An outline of the uniform cubing of stone has practically been completed as has the outline of terms and descriptions of various finishes for stone but are not in sufficiently complete form for final approval.

Methods of Testing and Nomenclature

Committee E-1 on Methods of Testing reports considerable progress on the many subject under its jurisdiction. The sections of the Technical Committee on Mechanical Testing have been particularly active. A method of Bend Testing for Ductility of Metals, prepared by the Bend Test Section, has been issued as tentative. Proposed Methods of Rockwell Hardness Testing have been drawn up by the Section on Indentation Hardness. Work is also being done on specifications for standardizing test blocks for Rockwell machines. Proposed Requirements for Speed of Tension Testing of Metallic Materials have been published for information and criticism. The Section on Elastic Strength has prepared proposed definitions of the terms "elastic limit" and "yield strength." "A Further Résumé of the Notched-Bar Impact Test in the Light of Present Knowledge," which summarizes recent discussions of the impact test and of its significance as correlated to experience in service, is appended to the current report. To promote further discussion in respect to methods of measuring thickness, a paper on "Measurement of Thickness of Textiles and Similar Materials," has been prepared.

The Technical Committee on Presentation of Data has made excellent progress, through the holding of round-table discussions in connection with its meetings, in acquainting those interested with the possibilities of the newer theories concerning statistical analysis and in the methods of presenting testing data. The Technical Committees on Size and Shape and on Consistency, Plasticity, etc., have made good progress during the year.

Committee E-8 on Nomenclature and Definitions approved for the advancement to standard the terms "spalling" and "pyrometric cone equivalent" as recommended by Committee C-8 on Refractories. Two new subcommittees have been organized during the year, one on Definition of Coke to harmonize definitions prepared by Committee D-5 on Coal and Coke and Committee D-2 on Petroleum Products and Lubricants, and the second on Definitions for Net Calorific Value and Gross Calorific Value, which will prepare definitions for these terms as applied to the several types of fuels.

Work extending over the past few years, looking toward the preparation of a definition for brick, has been completed, and a proposed definition published as information in the current report.

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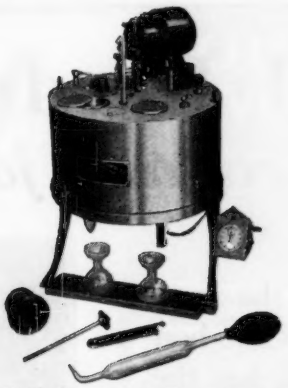

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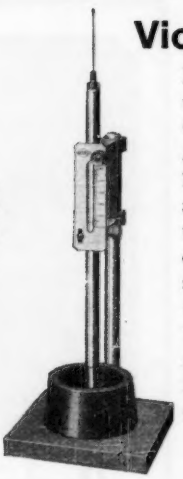

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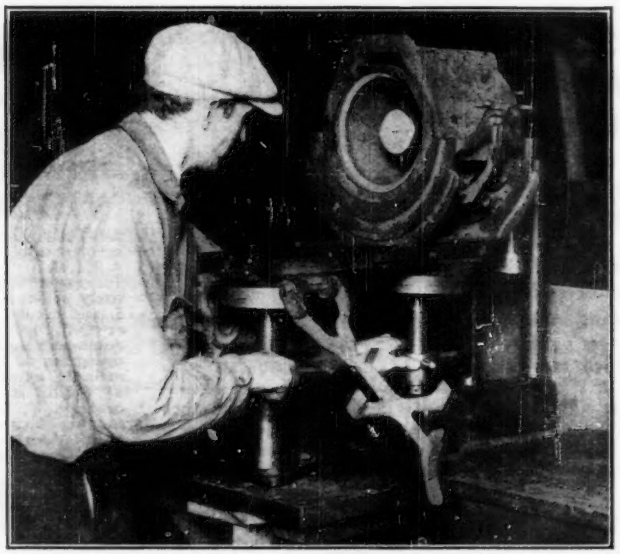

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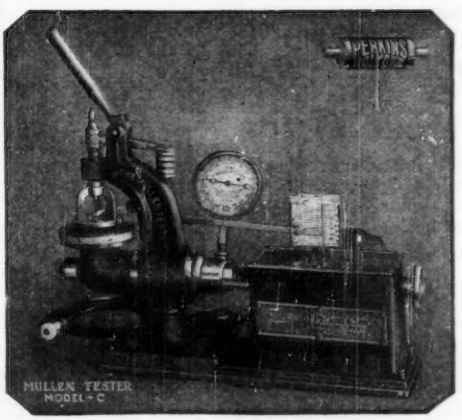

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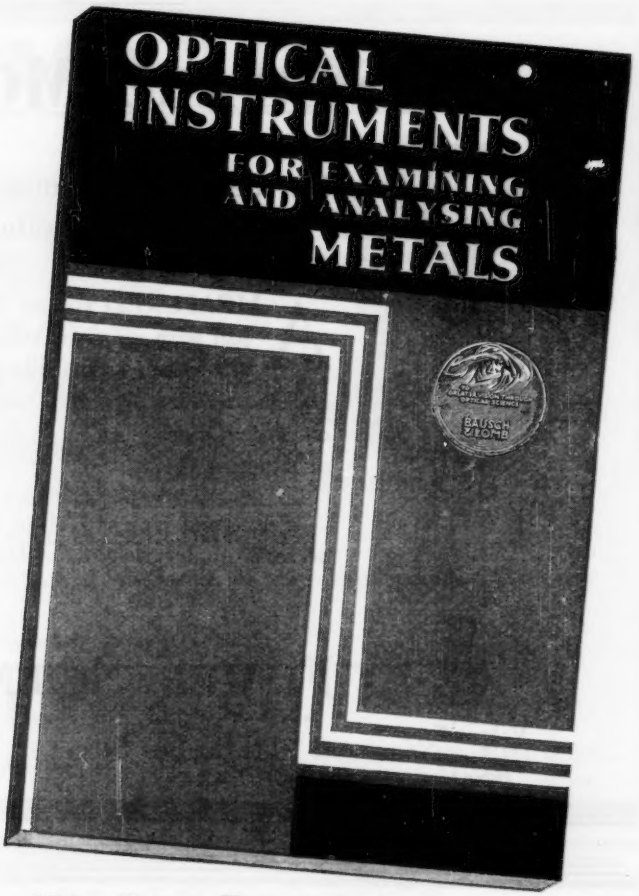

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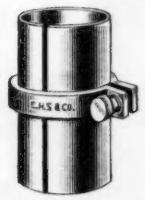

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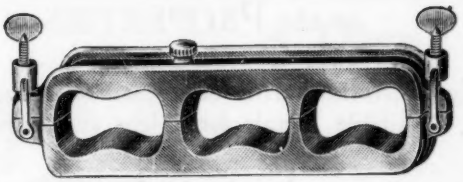

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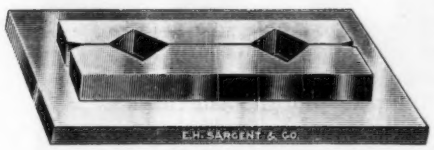

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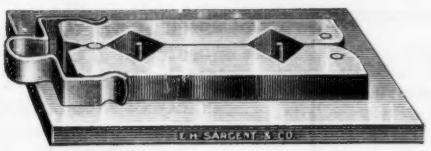

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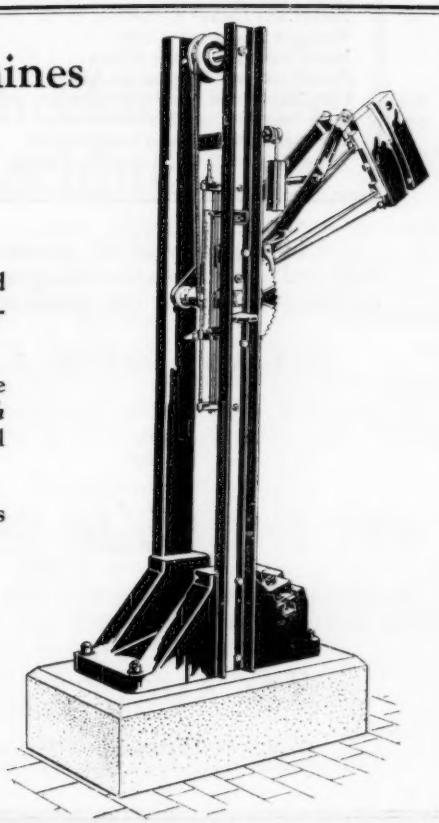

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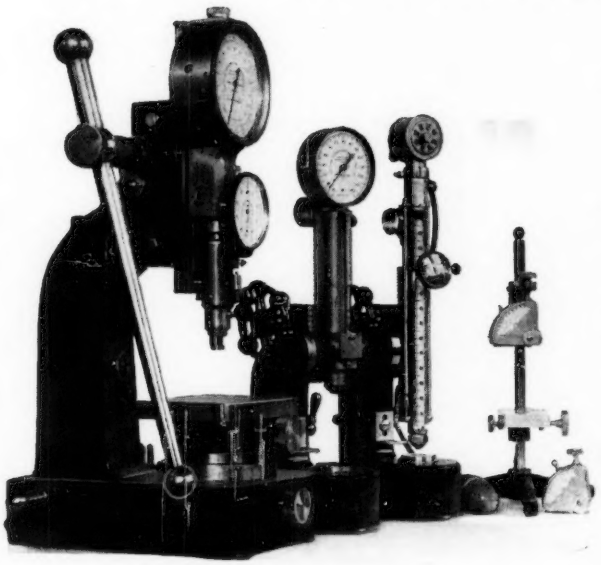

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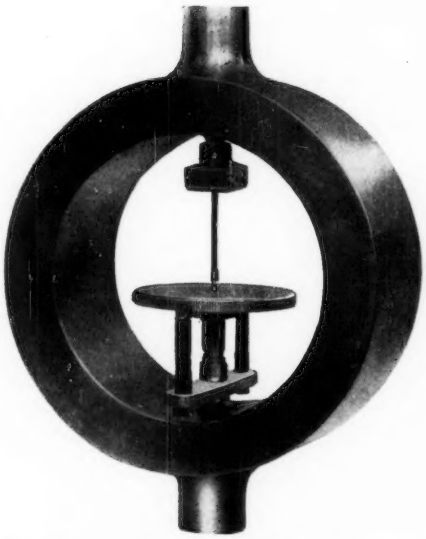

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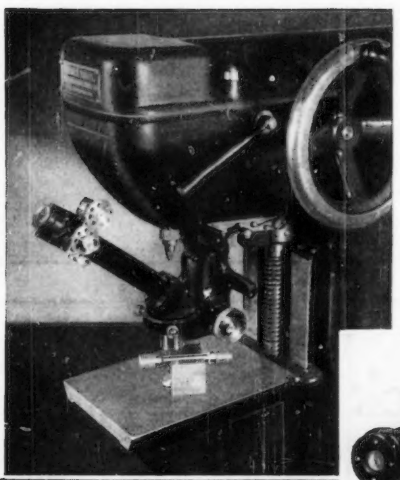

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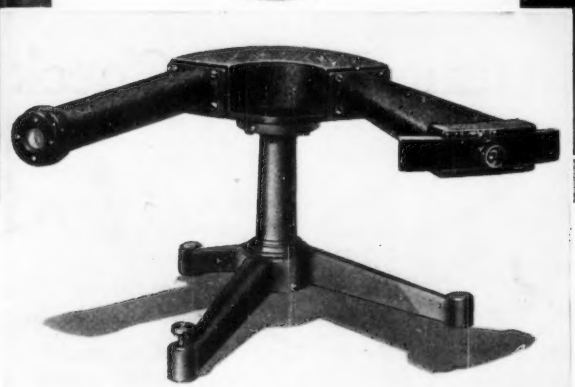

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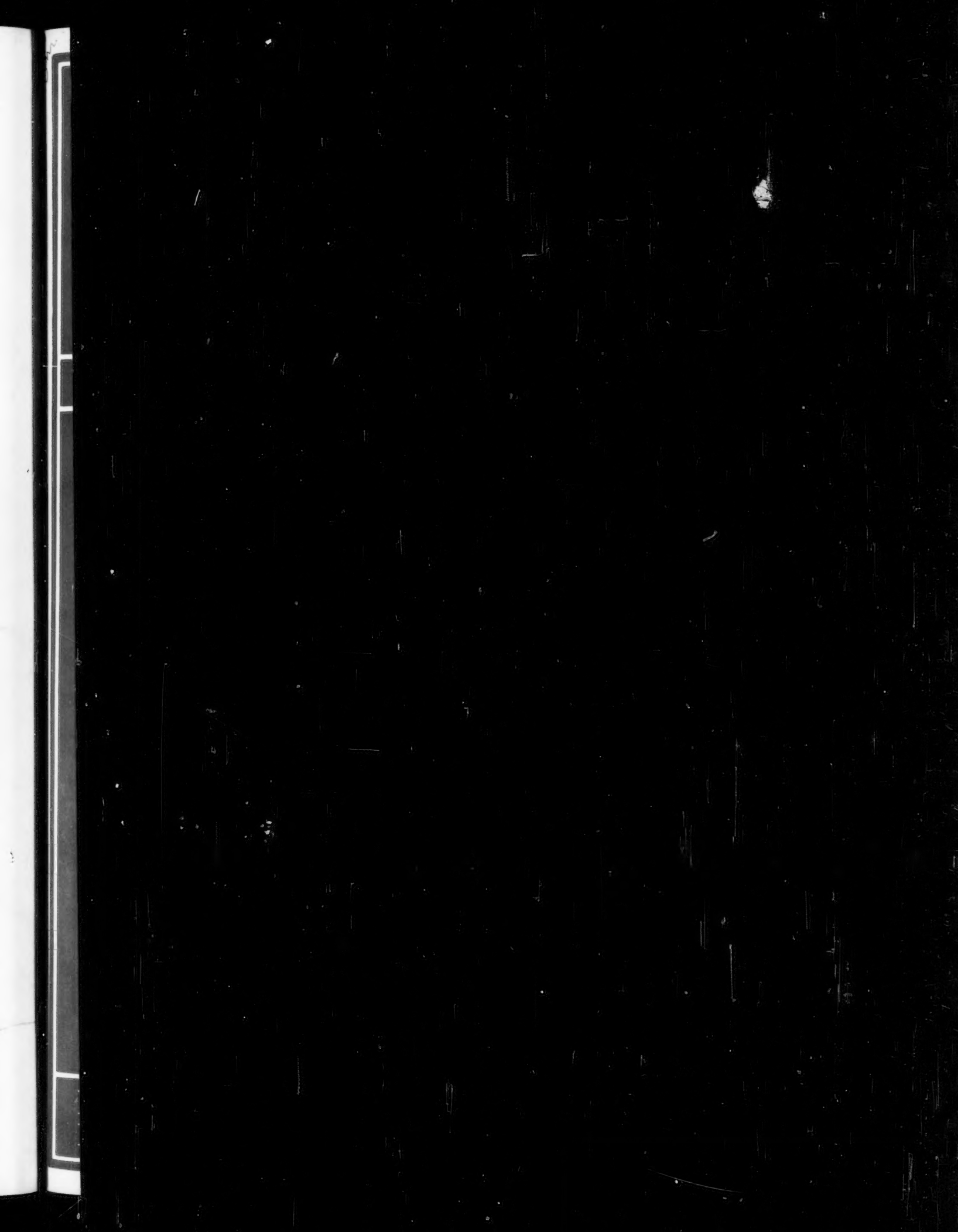
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